Name:

at1117paper: Complete the Square (v323)

Example

A square's edge length is x feet. A rectangle has a height of x feet and a width of 28 feet. Their combined area, found by adding the square's area and the rectangle's area, is 429 square feet. What is the value of x?

Example's Solution

$$x^2 + 28x = 429$$

To complete the square, add $\left(\frac{28}{2}\right)^2 = 196$ to both sides.

$$x^2 + 28x + 196 = 625$$

Recognize the left side is now a perfect-square trinomial. Factor the left side.

$$(x + 14)^2 = 625$$

Undo the squaring.

$$x + 14 = \pm\sqrt{625}$$

$$x + 14 = \pm 25$$

Subtract 14 from both sides.

$$x = -14 \pm 25$$

In this geometric example, we are only concerned about the positive solution. So,

$$x = 11$$

Question 1

A square's edge length is x feet. A rectangle has a height of x feet and a width of 52 feet. The total area, of the square and rectangle, is 480 square feet. What is the value of x?

$$x^2 + 52x = 480$$

$$x^2 + 52x + 676 = 1156$$

$$(x + 26)^2 = 1156$$

$$x + 26 = \pm 34$$

$$x = 8$$

Question 2

A square's edge length is x feet. A rectangle has a height of x feet and a width of 28 feet. The total area, of the square and rectangle, is 245 square feet. What is the value of x?

$$x^2 + 28x = 245$$
$$x^2 + 28x + 196 = 441$$
$$(x + 14)^2 = 441$$
$$x + 14 = \pm 21$$
$$x = 7$$

Question 3

A square's edge length is x feet. A rectangle has a height of x feet and a width of 26 feet. The total area, of the square and rectangle, is 192 square feet. What is the value of x?

$$x^2 + 26x = 192$$
$$x^2 + 26x + 169 = 361$$
$$(x + 13)^2 = 361$$
$$x + 13 = \pm 19$$
$$x = 6$$